DOCUMENT RESUME

ED 414 142 RC 021 288

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TITLE	Facilitating and Learning at the Edge of Chaos: Expanding the Context of Experiential Education.
PUB DATE	1997-11-00
NOTE	7p.; In: Deeply Rooted, Branching Out, 1972-1997. Annual AEE International Conference Proceedings; see RC 021 269.
PUB TYPE	Opinion Papers (120) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Creativity; *Experiential Learning; Group Dynamics; Models; Organizational Development; Play; Risk; Role of Education; *Systems Approach
IDENTIFIERS	*Chaos Theory; *Complex Adaptive Systems; System Dynamics

ABSTRACT

Significant recent discoveries within a number of scientific disciplines, collectively referred to as the science of complexity, are creating a major shift in how human beings understand the complex, adaptive systems that make up the world. A complex adaptive system consists of networks of large numbers of agents that interact with each other and with their environment according to a set of rules. This set of rules contains two subsystems: a dominant, or legitimate, subsystem that encompasses the system's primary task, and a recessive, or shadow, subsystem that operates outside of the system's primary task, providing the arena for play, exploration of new behaviors, and creativity. The shadow subsystem also seeks to undermine or modify the dominant subsystem through change. These two subsystems coexist in dynamic tension, and when the system is operating in the narrow zone between order and chaos, called a phase transition, or "the edge of chaos," it is operating at its highest level of functioning. Here is where the system creates space for novelty, where the greatest information processing takes place, where risks are taken and new behavior is tried out. Five factors that determine whether a system can move into the edge of chaos are identified. Practitioners of experiential education, working with and within complex human systems, already intuitively understand many aspects of complex system dynamics, and are ideally suited to use their skills in broader applications. Organizations and institutions shifting to the new paradigm of complex systems will operate from a conceptual framework with which experiential educators are already skilled. Includes suggestions for further reading. (Author/TD)

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Facilitating and Learning at the Edge of Chaos: Expanding the Context of Experiential Education

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B. Baker

ABSTRACT

Significant recent discoveries within a number of scientific disciplines, collectively referred to as the science of complexity, are creating a major shift in how we understand the complex, adaptive systems that make up our world. Practitioners of experiential education, working with and within complex human systems, already intuitively understand many aspects of complex system dynamics. As such, we are ideally suited to use our skills in broader applications. Organizations and institutions shifting to the new paradigm of complex systems will operate from a conceptual framework with which we are already skilled.

In recent years, developments within a number of diverse fields of study have identified patterns of similarity in the behavior of complex systems. These disciplines include quantum physics, microbiology, evolutionary biology, ecology, economics, and the social sciences. Collectively, these new ideas are coming together in a cross-disciplinary science of complexity. The science of complexity studies the dynamics of those systems that interact with their environment, learn from the experience, and modify their behavior as a result. This has particular relevance to the field of experiential education because, broadly speaking, our work is in assisting complex systems to learn, to grow, and to evolve.

A complex, adaptive system consists of networks of large numbers of agents who interact with each other and with their environment according to a set of rules. This set of rules, or schema, contains two subsystems, a dominant (or legitimate) subsystem that encompasses the system's primary task, and a re-

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cessive (or shadow) subsystem that operates outside of the system's primary task, providing the arena for play, exploration of new behaviors, and creativity. The shadow subsystem also seeks to undermine or modify the dominant subsystem through change.

These two subsystems coexist in dynamic tension, and when a certain balance between the two is present, when the system is operating in the narrow zone between order and chaos, the system is capable of remarkable things. This zone, which physicists call a phase transition, is also referred to as the "edge of chaos." Here the system creates the space for novelty, where new and surprising outcomes can emerge from creative activities, and where new ideas nibble away at the status quo.

The edge of chaos is a paradoxical state, a spiral dance between order and chaos, a humming oscillation between the two extremes, characterized by risk, exploration, experimentation. Here is where the system operates at its highest level of functioning, where the greatest information processing takes place, where risks are taken and new behavior is tried out. And when new behavior emerges that is somehow beneficial to the system, where the system's primary task and operating rules are modified in such a way that the system's overall level of "fitness" is improved relative to other systems, we say that the change is innovative; the system has learned, or evolved.

There are five factors, or control parameters, that determine whether a system can move into the edge of chaos (or beyond it into disintegration): the rate of information flow, the degree of diversity, the richness of connectivity, the level of contained anxiety, and the degree of power differentials. In human systems, these factors combine into a kind of creative tension where people are linked to others in paradoxical relationships of cooperation/competition, inspiration/anxiety, and compliance/individuality (group initiative to illustrate the process).

This is roughly the process that is going on all around us, within us, and occurring at all levels of adaptive phenomenon, from the subatomic to the macrocosmic. Systems are nested within systems and networks are connected to networks. Human groups, our families, communities, and social and political institutions are all forms of complex systems that operate according to the principles being identified by the science of complexity. Until recently, the patterns of similarity have not been apparent, partly because the disciplines which study each of these systems typically use differing vocabularies to describe their respective systems.

In the field of experiential education, we work with complex systems daily, although we tend not to think of them as such. The "Principles of Experiential Education Practice," as outlined in the AEE Membership Directory and Handbook, describe beautifully the dynamics of a living, adaptive, human system. They illustrate how a learner, "constructs knowledge, skill, and value" from direct interaction with others and the environment. These same principles suggest that experiential educators are adept at leading individuals and groups to the edge of chaos. We are skilled at "setting suitable experiences, posing problems, setting boundaries, supporting learners, ensuring physical and emotional safety, and facilitating the learning process." We are comfortable with ambiguity, unknown outcomes, the space for novelty and play, encouraging risks and new behavior, and we anticipate the "shadow" subsystem will play a significant role in the process.

The science of complexity gives us a framework to make sense of complex systems in a way that resonates more with our experience. More importantly, the science of complexity is pointing us in a direction that could fundamentally alter how we design our organizations and institutions, and how we expect them to function. As we make this paradigm shift, I believe the practitioners of experien-

tial education are well suited to take leadership roles.

In the world of human endeavor, organizations and the people within them are constantly engaged in a myriad of tasks in order to produce products or services. Organizations work to survive, to compete, and/or to cooperate with other organizations. Leaders of these organizations typically try to direct, manage, or impose a form of structure and order to the system, but frequently find the organization becomes powerfully resistive to change. This is because traditional management practices operate almost exclusively within the domain of the legitimate subsystem, which contains the set of rules designed to carry out the organization's primary tasks. However, the internal, "shadow" system works to subvert the legitimate system, typically thwarting leadership's efforts to direct the system.

Complexity theory suggests that systems cannot be willed, lead, or coerced to change. Traditional organizational interventions are usually short-lived and minimally effective because they don't take into account the interplay of the legitimate and shadow subsystems. The process of experiential education does, however. We build it into our design. We know how to create the conditions for maximized learning, and we know we cannot expect or predict a given outcome.

Indeed, as these ideas move more into the mainstream, the implications for any "leader," "educator," or "manager" (if such a term does not become obsolete) are enormous. If we anticipate that our communities and our workplaces will follow the patterns of complex living systems, instead of trying to control them, our endeavors can take on a new vitality. They may look a little more messy, but will be characterized by more creativity, more excitement, more surprises.

Following the complex system model, in the organization of the future the tasks of a leader will shift from directing, disciplining, and deciding. In an organization that values the interplay of the legitimate and shadow subsystems, the leader also must have (and communicate) a clear image of the task/objective/goal, create the environment that will allow the members to experiment with possibilities (to play within the space for novelty), and when necessary, to tweak the edges of the system in order to stimulate the group. Further, the leader will contain anxiety via support and encouragement, facilitate joint reflection on the process, and engage in true dialogue. The leader must also be willing to let go of a good deal of control and be willing to accept an unknown outcome.

This is the process already followed by a seasoned experiential educator. We don't solve problems, but allow a group to explore their own solutions; we don't minimize anxiety, but create an environment of emotional and physical trust that helps contain the anxiety; we don't force a group to hold to a predefined outcome, but allow the process to shape the outcome. Imagine what our businesses, our schools, our institutions would be like if they regularly exhibited the characteristic energy, exploration, and individual and collective discovery that occurs during a day of adventure programming.

We experiential educators help complex, adaptive systems learn and move. As a profession, we have been utilizing the patterns of system behavior now identified by the science of complexity. These patterns of behavior are applicable to any complex, adaptive system. As the framework of complex systems becomes more widely accepted, the approach and the application of experiential education has a vastly expanded potential. We are already doing what could be happening at all levels of our society. The possibilities for our work are limited only by our vision and creativity. And given that the field of experiential educa

tion already attracts professionals who are drawn to the edge of chaos, our capacity for creativity and innovation is enormous.

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